

What is claimed is:

1. A high frequency receiver comprising:
  - an input terminal for receiving a high frequency signal;
  - a filter coupled to said input terminal;
  - 5 a mixer of which one input part is coupled to an output part of said filter and the other input part is coupled to an output part of a frequency-variable local oscillator; and
    - an output terminal coupled to an output part of said mixer,
    - wherein said mixer is formed of an image rejection mixer, and said
  - 10 filter has a moderated damping characteristic with respect to a frequency when the image rejection mixer reduces the image.
2. A high frequency receiver according to claim 1, further comprising a high frequency amplifier disposed between said filter and the image rejection mixer.
- 15 3. A high frequency receiver according to claim 2, wherein said high frequency amplifier and the image rejection mixer are formed of a balanced circuit, and
  - 20 said high frequency amplifier and the image rejection mixer are inter-coupled in balance.
4. A high frequency receiver according to claim 2, further comprising a second filter disposed between said high frequency amplifier and the image rejection mixer,
  - 25 wherein said second filter is formed of a single tuning circuit.

5. A high frequency receiver according to claim 2, further comprising an input filter disposed between said input terminal and said high frequency amplifier,

wherein said input terminal is formed of a single tuning circuit.

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6. A high frequency receiver according to claim 5, further comprising a step-to-step filter disposed between said high frequency amplifier and the image rejection mixer,

wherein said step-to-step filter is a fixed filter.

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7. A high frequency receiver according to claim 6,

wherein the fixed filter is a high-pass filter.

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8. A high frequency receiver according to claim 6,

wherein the fixed filter is a low-pass filter.

9. A high frequency receiver according to claim 6,

wherein the fixed filter is a band-pass filter.

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10. A high frequency receiver according to claim 6,

wherein the fixed filter includes a plurality of filters having a different cutoff frequency and can switch between the filters in response to a received frequency.

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11. A high frequency receiver according to claim 2,

wherein said high frequency amplifier is directly coupled to the image rejection mixer.

12. A high frequency receiver according to claim 11,  
wherein said high frequency amplifier has a bipolar transistor.
- 5       13. A high frequency receiver according to claim 2,  
wherein at least both said high frequency amplifier and the image  
rejection mixer have a transistor formed by an identical process, and the  
transistor is stored in one integrated circuit.
- 10      14. A high frequency receiver according to claim 13,  
wherein said high frequency amplifier is directly coupled to the image  
rejection mixer.
- 15      15. A high frequency receiver according to claim 14,  
wherein said high frequency amplifier and the image rejection mixer  
have a bipolar transistor.
- 20      16. A high frequency receiver according to claim 1,  
wherein a frequency not higher than a frequency higher than a third  
harmonic frequency by a substantially intermediate frequency is supplied to the  
image rejection mixer, the third harmonic frequency being an oscillation  
frequency of the frequency-variable local oscillator when the lowest frequency in  
a received frequency band is received.
- 25      17. A high frequency receiver according to claim 1, wherein  
said filter passes a frequency not higher than at least a predetermined  
cutoff frequency, and

the cutoff frequency is a frequency not higher than a frequency higher than a third harmonic frequency by a substantially intermediate frequency, the third harmonic frequency being an oscillation frequency of the frequency-variable local oscillator when the lowest frequency in a received frequency band  
5 is received.

18. A high frequency receiver according to claim 17, wherein  
said high frequency receiver is used for receiving a television broadcast,  
said input terminal receives a high frequency signal of the television  
10 broadcast as the high frequency signal,  
said filter passes a frequency in the received frequency band,  
said high frequency receiver comprises:  
a high frequency amplifier interposed between said input terminal  
and said filter; and  
15 a switch of which common terminal is disposed between said high  
frequency amplifier and said filter and is coupled to an output part of said high  
frequency amplifier, one output part is coupled to said filter, and the other  
output part is coupled to an input part of the image rejection mixer, and  
said switch is coupled to the other output part when a frequency not  
20 lower than the cutoff frequency of said filter is received.

19. A high frequency receiver comprising:  
an input terminal for receiving a high frequency signal;  
a filter coupled to the input terminal;  
25 a mixer of which one input part is coupled to an output part of the  
filter and the other input part is coupled to an output part of a frequency-  
variable local oscillator; and

an output terminal coupled to an output part of the mixer,  
wherein

    said mixer is formed of an image rejection mixer,

    said filter has a reduced damping characteristic with respect to a  
5    frequency at which the image rejection mixer reduces the image, and

    said input terminal receives a frequency not higher than a  
frequency higher than a third harmonic frequency by a substantially  
intermediate frequency, the third harmonic frequency being an oscillation  
frequency of the frequency-variable local oscillator when the lowest frequency in  
10    a received frequency band is received.

20. A high frequency receiver according to claim 1, wherein a reduction  
amount of the image by the image rejection mixer is increased with respect to a  
specific channel having a small damping amount of a passing characteristic of  
15    said filter.

21. A high frequency receiver according to claim 1, wherein said filter  
has a variable image trap capable of damping image frequency in response to at  
least a received channel.

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22. A high frequency receiver according to claim 1, wherein  
    said filter has a first filter for passing a frequency in a VHF low band  
and a second filter for passing a frequency in a VHF high band, the second filter  
being disposed in parallel with the first filter,

25    a variable image trap is coupled to the first filter, and

    the variable image trap damps image frequency of a received channel  
when the VHF low band is received, and damps frequency of the VHF low band

when the VHF high band is received.

23. A high frequency receiver according to claim 1, further comprising a high frequency amplifier disposed between said input terminal and said filter.

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24. A high frequency receiver according to claim 23, wherein said input terminal is directly coupled to said high frequency amplifier.

10 25. A high frequency receiver according to claim 1, wherein said filter is formed of a double tuning circuit.

26. A high frequency receiver according to claim 1, wherein said filter is formed of a fixed filter.

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27. A high frequency receiver comprising:

an input terminal for receiving a high frequency signal of a television broadcast;

a UHF receiving unit that is coupled to said input terminal and receives a UHF signal;

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an output terminal coupled to an output part of said UHF receiving unit; and

a VHF receiving unit coupled in parallel with said UHF receiving unit,

wherein

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said UHF receiving unit comprises:

a first tuning filter that is coupled to said input terminal and can vary tuned frequency in a UHF band;

a first high frequency amplifier coupled to an output part of the first tuning filter; and

5        a first mixer of which one input part is coupled to an output part of the first high frequency amplifier and the other input part is coupled to an output part of a first local oscillator,

said VHF receiving unit comprises:

      a second tuning filter that is coupled to said input terminal and can vary tuned frequency in a VHF band;

10      a second high frequency amplifier coupled to an output part of the second tuning filter;

      a step-to-step filter coupled to an output part of second high frequency amplifier; and

15      a second mixer interposed between the step-to-step filter and said output terminal, one input part of the second mixer being coupled to an output part of the step-to-step filter, the other input part of the second mixer being coupled to an output part of a second local oscillator,

      the first mixer and the second mixer are image rejection mixers,

      the step-to-step filter is a filter for passing a frequency not higher than at least a predetermined cutoff frequency, and

20      the cutoff frequency is not higher than a frequency higher than a third harmonic frequency by a substantially intermediate frequency, the third harmonic frequency being an oscillation frequency of the frequency-variable local oscillator when the lowest frequency in a received frequency band is received.

25      28. A high frequency receiver according to claim 1, wherein said filter has a fixed trap for damping image frequency in a VHF low band.

29. A high frequency receiver according to claim 28, wherein a trap frequency of the fixed trap is substantially equal to an image frequency occurring when a frequency of a substantially central channel of the VHF low band is received.

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30. A high frequency receiver comprising:
- an input terminal for receiving a high frequency signal;
  - a filter coupled to the input terminal;
  - a switch of which common terminal is coupled to an output part of
  - 10 said filter
    - a double balanced mixer of which one input part is coupled to an output part of said switch and the other input part is coupled to an output part of a frequency-variable local oscillator;
    - a demodulator coupled to an output part of said double balanced
    - 15 mixer;
      - an output terminal coupled to one output part of said demodulator;
      - an image rejection mixer interposed between the other output part of said switch and said demodulator, one input part of said image rejection mixer being coupled to the other output part of said switch, the other input part of said
      - 20 image rejection mixer being coupled to an output part of the frequency-variable local oscillator;
      - a determining device that is coupled to the other output part of said demodulator and determines existence of an image signal in received signals; and
    - 25 a controller for controlling said switch in response to a determining result of said determining device,
    - wherein said controller connects said switch to said image rejection

mixer when said determining device determines that the received signals include an image interference.

31. A high frequency receiver comprising:

5           an input terminal for receiving a high frequency signal;  
          a filter coupled to said input terminal;  
          a mixer of which one input part is coupled to an output part of said filter and the other input part is coupled to an output part of a frequency-variable local oscillator; and

10           an output terminal coupled to an output part of said mixer,

          wherein said mixer is formed of an image rejection mixer, and said filter has a moderated damping characteristic with respect to a plurality of frequencies on an input side for generating an interfering signal of an image frequency, the interfering signal being reduced by the image rejection mixer.

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32. A high frequency receiver comprising:

          an input terminal for receiving a high frequency signal;  
          a filter coupled to the input terminal;  
          a mixer of which one input part is coupled to an output part of said filter and the other input part is coupled to an output part of a frequency-variable local oscillator;

          a demodulator coupled to an output part of said mixer;

          an output terminal coupled to one output part of said demodulator;

20           a determining device that is coupled to the other output part of said demodulator and determines existence of an image signal in received signals;

          a controller coupled to an output part of said determining device; and

          a switch interposed between said controller and said mixer,

wherein said mixer is formed of image rejection mixers of a plurality of mixers, said controller controls said switch to operate only one of the image rejection mixers when said determining device determines existence of an image signal.